FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U.S. Department of Energy

Office of Science, Office of Biological and Environmental Research

Low Dose Radiation Research Program – Basic Biology

Funding Opportunity Number: **DE-FG02-06ER06-10**

Announcement Type: **Initial**

CFDA Number: **81.049**

ISSUE DATE: **January 31, 2006**

PREAPPLICATION DUE DATE: **February 22, 2006, 4:30 pm Eastern Time**

APPLICATION DUE DATE: **April 26, 2006, 8:00 pm Eastern Time**

.

NOTE: NEW REQUIREMENTS FOR GRANTS.GOV

Where to Submit: Applications must be submitted through Grants.gov to be considered for award.

Registration Requirements: There are several one-time actions you must complete in order to submit an application through Grants.gov (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See www.grants.gov/GetStarted. Use the Grants.gov Organization Registration Checklist at www.grants.gov/assets/OrganizationRegCheck.doc to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at least 14 days to complete these requirements. It is suggested that the process be started as soon as possible.

Questions: Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. Part VII of this announcement explains how to submit other questions to the U.S. Department of Energy.

Application Receipt Notices

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of four e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. You will know that your application has reached DOE when the AOR receives email Number 4. You will need the Submission Receipt Number (email Number 1) to track a submission. The titles of the four e-mails are:

Number 1 - Grants.gov Submission Receipt Number
Number 2 - Grants.gov Submission Validation Receipt for Application Number
Number 3 - Grants.gov Grantor Agency Retrieval Receipt for Application Number
Number 4 - Grants.gov Agency Tracking Number Assignment for Application Number

After receipt of email Number 4, you can view your application at DOE's e-Center, http://e-center.doe.gov. A User Id and password are required. If you already have a User Id and password you do not need to re-register.

VERY IMPORTANT – Download PureEdge Viewer: In order to download the application package, you will need to install PureEdge Viewer. This small, free program will allow you to access, complete, and submit applications electronically and securely. For a free version of the software, visit the following web site: www.grants.gov/DownloadViewer.

TABLE OF CONTENTS

D. Proprietary Application Information
E. Evaluation and Administration by Non-Federal Personnel
F. Intellectual Property Developed under this Program
G. Notice of Right to Request Patent Waiver
H. Notice Regarding Eligible/Ineligible Activities
I. Reference Material

PART I – FUNDING OPPORTUNITY DESCRIPTION

SUMMARY: The Office of Biological and Environmental Research (BER) of the Office of Science (SC), U.S. Department of Energy (DOE) and the Human Research Program (HRP), National Aeronautics and Space Administration (NASA), hereby announce their interest in receiving grant applications for new research to develop a better scientific basis for understanding exposures and risks to humans from low doses or low fluences of ionizing radiation. Research must support the DOE/BER Low Dose Radiation Research Program, and may include complementary research of direct interest to the NASA/HRP Space Radiation Project of sufficient scientific merit to qualify for partial NASA support. To be considered for funding, research must focus on elucidating molecular mechanisms and pathways involved in normal radiobiological responses to low dose exposure; exclusively phenomenological studies will not be considered. New research is especially encouraged that focuses on molecular responses at tissue- and higher levels of biological organization. Scientists working in rapidly developing areas of biological sciences not necessarily associated with the study of radiation are also encouraged to consider the contributions that their field of study can make. High risk research having the potential to rapidly advance the field, and research employing genome-wide or proteome-wide methods, is particularly encouraged.

DOE/BER also announces its interest in receiving applications for special grants to support new collaborative work between two or more laboratories, one or more of which is already funded by the DOE Low Dose Program. These "glue grants" are primarily designed to support post-doctoral or graduate-student research that will enable laboratories with complementary expertise to develop and apply innovative new approaches to low dose radiation research. **Please review the Supplementary Information sections below for further discussion of programmatic needs, and for details on format for the two types of applications.**

SUPPLEMENTARY INFORMATION

I. Specifics for the Low Dose Radiation Research Program (DOE)
II. Specifics for Glue Grants (DOE)

III. Specifics for the Space Radiation Project (NASA)

I. Specifics for the Low Dose Radiation Research Program (DOE)

The DOE/BER Low Dose Radiation Research Program has the challenge of conducting research that can be used to inform the development of future national radiation risk policy for the public and the workplace. The Low Dose Program is chiefly concerned with very low doses of low Linear Energy Transfer (LET) radiation (high energy electrons and protons, x- and gamma-rays). The focus of research should be on doses of low LET radiation that are at or near current workplace exposure limits. In general, research is desired that focuses on total radiation doses that are less than 0.1 Gray (Gy) (10 rads). Some experiments will likely involve selected exposures to higher doses of radiation for comparisons with previous experiments or for determining the validity of extrapolation methods previously used to estimate the effects of low doses of radiation from observations made at high doses.

Low dose-rate studies are also very desirable. In these studies it is important that the range of total doses delivered also encompass the low dose range, i.e., total doses should adequately cover

the range of 0.1 Gy or less in addition to any higher total doses. It is worth noting that experimental delivery of only 0.01 Gy (1 rad) over a period of 24 hours is still an approximately 1000-fold higher dose rate than the average background radiation dose rate in the U.S. It is probable that a normal biological system might have molecular sensors that detect and respond to a 1000-fold change in environmental conditions, and research is sought to elucidate these responses, if they exist.

Until fairly recently, most molecular studies of radiation effects were carried out using isolated cells in monolayer culture, and the responses of those cells were then extrapolated to mammalian tissues and organisms. There is already compelling evidence that molecular endpoint measurements such as gene expression and apoptosis induction can differ significantly in quality and/or quantity as a function of radiation dose, both in whole animal experimental systems and in the more artificial cell culture systems. New research indicates that molecular endpoint measurements are also qualitatively different as a function of the level of biological organization (cells, tissues, or whole organisms), and that normal, intact tissue may respond, in general, very differently to radiation than monoculture/monolayer cell populations. Innovative new research is needed to explore and more fully understand low dose radiation-induced molecular responses, and subsequent health outcomes, at these higher levels of biological organization.

New models for human health risk from low doses of radiation are also needed that incorporate the results of both low dose /dose-rate human epidemiological studies and the newer low dose / dose-rate biological studies.

Not all research on the biological effects of low doses of radiation will be equally useful for the development of radiation risk policy, though the path from basic radiation biology research to radiation risk policy is admittedly not clear at this time. In the present context, the research considered to be most useful will focus on biological outcomes after very low dose exposures and/or very low dose-rate exposures. Rather than just quantifying phenomenological outcomes, the research goal will be to elucidate molecular mechanisms involved. Research should also study responses in cells that reside in intact tissues or whole organisms, rather than experiments entirely in cell culture. Because information on regulatory, metabolic, and signaling pathways is growing rapidly, applications should point out, wherever possible, how the proposed research might link with, clarify, and/or extend this information. Finally, successful applications will ideally have an approach or component (whether experimental or modeling) that could potentially link data from experiment to downstream health outcomes that might occur in humans.

Alternatively, a biological response of interest could meet all of the above criteria only at high doses but may actually be absent (as opposed to simply undetectable) at low doses of radiation. Since evidence is accumulating that the mechanisms of action after high doses of radiation may be different from the mechanisms of action after low doses, such studies would help define these mechanisms. Defining the doses where these mechanisms shift is of critical importance.

The Low Dose Program will be a success if the science it generates is useful to policy makers, standard setters, and the public. Successful applicants will be expected to effectively communicate research results through publication in peer-reviewed journals. Any data and results generated through the investigations that are appropriate to share with the broader scientific community should, where possible, be provided in a format amenable to deposition in databases. Successful applicants will also be encouraged to communicate with the wider

community of concerned persons, so that current thinking and public debate are better able to reflect sound science.

The DOE Low Dose Program is already making significant investments and progress in topics such as DNA damage and repair, endogenous oxidative damage versus low dose radiation-induced damage, radio-adaptive responses, bystander effects, genomic instability, and individual genetic susceptibility to low dose radiation exposure. Descriptions of these topics can be found in the open literature via PubMed, http://www.ncbi.nlm.nih.gov/entrez/query.fcgi, and on the Program website, http://lowdose.tricity.wsu.edu/. Information on current and past Program-funded projects, publications lists, and other information relevant to low dose radiation studies can also be found on the Program website.

The DOE Low Dose Program is currently funding several projects that have developed micro-irradiation devices capable of delivering low doses of low LET radiation to individual cells or to specific parts of individual cells. Investigators are encouraged to use these irradiators, as appropriate, through collaborative means. Information on the microbeam irradiators can be found at: http://lowdose.tricity.wsu.edu/radiobio_techniques.htm.

Several tissue repositories are available for Low Dose Program investigations. The University of Washington has a tissue repository containing cell lines derived from patients who developed second cancers following total body irradiation and hematopoietic stem cell transplantation (HSCT). Presently there are EBV- transformed cell lines from 25 individuals exposed to radiation, which subsequently developed a skin tumor, and an equal number from exposed individuals that have not yet developed a second cancer. Please contact directly Dr. Jeffrey L. Schwartz, Associate Professor of Radiation Oncology, University of Washington, (206) 598-4091, E-mail: jschwart@u.washington.edu, for collaborative opportunities. Other available resource material are fixed animal and human tissue samples from individuals exposed to either external radiation or to internally deposited radioactive materials. For information on these tissue archives, please contact Dr. Gayle Woloschak, Northwestern University (312) 503-4322, g-woloschak@northwestern.edu.

II. Specifics for Glue Grants (DOE)

The Low Dose Radiation Research Program is also interested in receiving applications for the purpose of supporting collaborative work between two laboratories, one of which should be currently funded by the Program. These small grants are primarily designed to support post-doctoral or graduate-student research that will enable laboratories with complementary expertise to develop and apply innovative or collaborative approaches to low dose research, although comparative studies between laboratories already using similar experimental approaches are also encouraged. At least one of the applicant partners must hold a DOE grant focusing on low dose studies, and both applicant partners must have at least 1 year of support remaining on their core grants at the time of award (~November 2006). Collaborative glue grants can be set up with laboratories funded by such diverse agencies as DOE, NIH/NCI, NASA, DOD, EPA, the European Union, Canada, France, or Japan, but in any case the proposed research must be of interest to the DOE Low Dose Radiation Research Program. Applications for these small grants should review the sections above on programmatic needs, and must also follow the instructions

in Grants.gov for electronic submission. Please note: the Project Description for the glue grant application should not exceed ten pages.

III. Specifics for the Space Radiation Project (NASA)

The NASA/HRP Space Radiation Project is charged with providing input for the determination of health risks to humans visiting the space radiation environment. NASA is especially interested in human exposure to low fluences of high-energy particulate ionizing radiation (protons and heavy ions). Applications whose principal focus is on low LET radiation are encouraged to include complementary research with high-energy particulate ionizing radiation that leverages progress, resources, and technology used for the low LET radiation research. Investigators with currently funded low dose projects may also apply for supplementary funding to address closely related research of interest to NASA.

The primary area of emphasis of the NASA/HRP Space Radiation Project is the development of mechanistic insights into biological effects of space radiation that account for radiation risks. Applications are required to be hypothesis-driven and are expected to obtain their data in ground-based experimental radiobiology studies with protons and high-energy heavy ion beams in the energy range corresponding to space radiation. This is mainly a ground-based program using accelerator facilities to simulate space radiation. In addition to the research topics already described above this includes research on non-phenomenological predictors of late cell and tissue effects and the control and modification of radiation effect mechanisms

A description of the current awards in the Space Radiation Project may be found at: http://taskbook.nasaprs.com/peer_review/index.cfm. (Search by checking Radiation Health) A description of the ground-based facilities and experimental program at Brookhaven National Laboratory can be found at: http://server.c-ad.bnl.gov/esfd/nsrl/index.html. The proton therapy facilities at Loma Linda University Medical Center are described at: http://research.hq.nasa.gov/code_u/bcpr/index.cfm.

Research applications to which NASA will assign high priority:

a. Studies that increase the confidence in the accuracy of extrapolating the probability of radiation-induced genetic alterations or carcinogenesis from rodents to humans.
b. Determination of carcinogenic risks following irradiation by protons and HZE particles.
c. Determination if exposure to heavy ions at the level that would occur in deep space poses a risk to the integrity and function of the central nervous system.

This opportunity does not request applications for flight research. Research applications are expected to utilize beams of charged particles available at the NASA Space Radiation Laboratory (NSRL) or lower energy (< 250 MeV) protons at the Loma Linda University Medical Center Proton Treatment Facility, and to address experimental data obtained with such beams in ways leading to significant predictions that can be tested in future experiments.

NASA envisions that the selected applications will be structured and operated in a manner that supports the country's educational initiatives and goals (including historically black colleges and universities and other minority universities), and in particular the need to promote scientific and technical education at all levels. NASA envisions that the selected applications will support the

goals for public awareness and outreach to the general public. The selected investigators are invited to participate in NASA-funded educational programs.

The particles of interest to the Space Radiation Project are protons with energies between 20 and 1000 MeV, and nuclei of elements with atomic numbers between helium and iron, with energies between 50 and 3000 MeV/nucleon. Fluences of interest are of the order of 1-2 particles per cell; studies with higher fluences will need to be justified by compelling arguments, including an explanation of how the results can be applied in the low fluence regime. NASA has developed facilities for use of protons at Loma Linda University Medical School and high-energy heavy ion beams at the NASA Space Radiation Laboratory (NSRL) at Brookhaven National Laboratory. Applications should not budget for the use of beams at these facilities, which is paid by NASA. NASA will cooperate with DOE to provide the range of technical resources available for experimentation and analysis of experimental results at Brookhaven National Laboratory.

The Office of Science, as part of its grant regulations, requires at 10 CFR 605.11(b) that a recipient receiving a grant to perform research involving recombinant DNA molecules and/or organisms and viruses containing recombinant DNA molecules shall comply with the National Institutes of Health "Guidelines for Research Involving Recombinant DNA Molecules", which is available via the World Wide Web at: http://www.niehs.nih.gov/odhsb/biosafe/nih/rdna-apr98.pdf, (59 FR 34496, July 5, 1994), or such later revision of those guidelines as may be published in the Federal Register.

DOE policy requires that potential applicants adhere to 10 CFR 745 “Protection of Human Subjects” or such later revision of those guidelines as may be published in the Federal Register. DOE requirements for reporting, protection of human and animal subjects and related special matters can be found on the World Wide Web at: http://www.science.doe.gov/grants/Welfare.html.

PART II – AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT.

DOE anticipates awarding grants under this program announcement.

B. ESTIMATED FUNDING.

It is anticipated that up to $3 million annually will be available from DOE/BER for approximately 15 awards for this Notice. Initial awards will be in Fiscal Year 2007, and applications may request project support for up to three years. All awards are contingent on the availability of funds and programmatic needs. Multi-year funding of grant awards is expected, and is also contingent upon the availability of appropriated funds, progress of the research, and continuing program need. Additional funds of up to $0.5 M annually will be available from NASA for joint funding of new research, also contingent upon the availability of funds. NASA provides beam time at the NSRL and the Loma Linda proton accelerator; investigators will not be required to pay for the beam time.

The Glue Grant awards should range between $85,000 and $125,000 per year, total costs, and run from 1 to 3 years.

C. MAXIMUM AND MINIMUM AWARD SIZE.

Ceiling (i.e., the maximum amount for an individual award made under this announcement): See Above

Floor (i.e., the minimum amount for an individual award made under this announcement): See Above

D. EXPECTED NUMBER OF AWARDS.

The number of awards will be contingent on satisfactory peer review, the availability of appropriated funds and the size of the awards.

E. ANTICIPATED AWARD SIZE.

N/A

F. PERIOD OF PERFORMANCE.

N/A

G. TYPE OF APPLICATION.

N/A

PART III - ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS.

All types of applicants are eligible to apply, except other Federal agencies, Federally Funded Research and Development Center (FFRDC) Contractors, and nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995.

Researchers from Federally Funded Research and Development Centers (FFRDCs) or DOE National Laboratories should respond to Program Announcement LAB 06-10, available at the following web address: http://www.science.doe.gov/grants/LAB06_10.html.

B. COST SHARING

Cost sharing is not required.

C. OTHER ELIGIBILITY REQUIREMENTS.

N/A

PART IV – APPLICATION AND SUBMISSION INFORMATION

A. ADDRESS TO REQUEST APPLICATION PACKAGE.

Application forms and instructions are available at Grants.gov. To access these materials, go to http://www.grants.gov, select "Apply for Grants", and then select "Download Application Package". Enter the CFDA and/or the funding opportunity number located on the cover of this announcement and then follow the prompts to download the application package. NOTE: You will not be able to download the Application Package unless you have installed PureEdge Viewer (See: http://www.grants.gov/DownloadViewer).

B. LETTER OF INTENT AND PRE-APPLICATION.

1. Letter of Intent.

Letters of Intent are not required.

2. Pre-application.

Potential applicants are strongly encouraged to submit a brief pre-application, referencing Program Notice DE-FG02-06ER06-10, for receipt by DOE by February 22, 2006. A response to the preapplications encouraging or discouraging formal applications will be communicated to the applicants by March 3.

Preapplications referencing Program Notice DE-FG02-06ER06-10, should be sent to SClifesci.lowdose@science.doe.gov. Applications submitted to the Office of Science must be submitted electronically through Grants.Gov to be considered for award.

Preapplications

Potential applicants are strongly encouraged to submit a brief preapplication that consists of two to three pages of narrative describing the research objectives, and the technical approach(s), and the proposed team members and their expertise. The intent in requesting a preapplication is to save the time and effort of applicants in preparing and submitting a formal project application that may be inappropriate for the program. Preapplications will be reviewed relative to the scope and research needs. The preapplication should identify, on the cover sheet, the title of the project, the institution, principal investigator name, telephone number, fax number, and e-mail address. No budget information or biographical data need be included, nor is an institutional endorsement necessary.

C. CONTENT AND FORM OF APPLICATION – SF 424 (R&R)

You must complete the mandatory forms and any applicable optional forms (e.g., SF-LLL-Disclosure of Lobbying Activities) in accordance with the instructions on the forms and the additional instructions below**. Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.**

1. **SF 424 (R&R**
   Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. To activate the instructions, turn on the "Help Mode" (Icon with the pointer and question mark at the top of the form). The list of certifications and assurances referenced in Field 18 can be found on the Applicant and Recipient Page at http://grants.pr.doe.gov.

2. **RESEARCH AND RELATED Other Project Information.**
   Complete questions 1 through 5 and attach files. The files must comply with the following instructions:

   Project Summary/Abstract (Field 6 on the Form)
   The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to publication. It should be a single page that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (i.e., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as the Department may make it available to the public. The project summary must not exceed 1 page when printed using standard 8.5" by 11" paper with 1" margins (top, bottom, left and right) with font not smaller than 11 point. To attach a Project Summary/Abstract, click "Add Attachment."

   Project Narrative (Field 7 on the form)
   The project narrative must not exceed 20 pages **(NOTE: Project Narratives for Glue Grants should not exceed 10 pages.)**, including charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right). EVALUATORS WILL ONLY REVIEW THE NUMBER OF PAGES SPECIFIED IN THE PRECEDING SENTENCE. The font must not be smaller than 11 point. Do not include any Internet addresses (URLs) that provide information necessary to review the application, because the information contained in these sites will not be reviewed. **All applications should be in a single PDF file, if possible.** To attach a Project Narrative, click "Add Attachment."

   The narrative should be written in strict compliance with the following ordered format and submitted to Grants.gov as a single PDF file (with the exception of the Abstract, as addressed above, which is attached separately when submitting through Grants.gov) and attached as the Project Narrative:

   Title Page; single page, title page of your narrative must include the following:
   - Applicant/Institution:
   - Street Address/City/State/Zip:
   - Principal Investigator:
   - Address:
   - Telephone Number:

- Email:
- DOE/Office of Science Program Office:
- DOE/Office of Science Program Office Technical Contact:
- DOE Grant Number (if Renewal or Supplemental Application):
- Is this a Collaboration? If yes, please list ALL Collaborating Institutions/PIs* and indicate which ones will also be submitting applications.

* Note that collaborating applications must be submitted separately.

Relevance Statement; single page only, should identify DOE- or NASA-relevant research that each specific aim is intended to address

Project Narrative, 20 pages or less, exclusive of attachments. Applications with Project Narratives longer than 20 pages will be returned to applicants and will not be reviewed for scientific merit. **(NOTE: Project Narratives for Glue Grants should not exceed 10 pages.)** The project narrative should be a clear statement of the work to be undertaken and should include: objectives for the period of the proposed work and expected significance; relation to the longer-term goals of the principal investigator of the project; and relation to the present state of knowledge in the field, to work in progress by the investigator under other support, and work in progress elsewhere. The statement should outline the general plan of work, including the broad design of experiments to be undertaken, and an adequate description of experimental methods and procedures.

Literature Cited

Biographical Sketches (please limit to 2 pages per senior investigator, consistent with NIH guidelines)

Facilities and Resources description

Current and Pending Support for each senior investigator

Letters of Intent from collaborators (if applicable)

The narrative comprises the research plan for the project. The project narrative should be a clear statement of the work to be undertaken and should include: objectives for the period of the proposed work and expected significance; relation to the longer-term goals of the principal investigator of the project; and relation to the present state of knowledge in the field, to work in progress by the investigator under other support, and work in progress elsewhere. The statement should outline the general plan of work, including the broad design of experiments to be undertaken, and an adequate description of experimental methods and procedures. Letters of intent from all non-funded collaborators and short curriculum vitae of all senior personnel must be included in the application. Applications not meeting these requirements will be deemed ineligible during the initial screening process.

The project narrative must include:

- Project Objectives.
  This section should provide a clear, concise statement of the specific objectives/aims of the proposed project.

- Merit Review Criterion Discussion.
  The section should be formatted to address each of the merit review criterion and sub-criterion listed in Section V. A. Provide sufficient information so that reviewers will

be able to evaluate the application in accordance with these merit review criteria. DOE WILL EVALUATE AND CONSIDER ONLY THOSE APPLICATIONS THAT ADDRESS SEPARATELY EACH OF THE MERIT REVIEW CRITERION AND SUB-CRITERION.

- Evaluation Phase
  This section must include a plan and metrics to be used to assess the success of the project.

- Project Performance Site
  Indicate the primary site where the work will be performed. If a portion of the work will be performed at any other sites, identify those sites, also.

- Biographical Sketch Appendix
  Provide a biographical sketch for the project director/principal investigator (PD/PI) and each senior/key person listed in Section A on the R&R Budget form. **Provide the biographical sketch information as an appendix to your project narrative. Do not attach a separate file.** The biographical sketch appendix will not count in the project narrative page limitation. The biographical information for each person must not exceed 2 pages when printed on 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) with font not smaller than 11 point and must include:

  Education and Training. Undergraduate, graduate and postdoctoral training, provide institution, major/area, degree and year.

  Research and Professional Experience: Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

  Publications. Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically.

  Patents, copyrights and software systems developed may be provided in addition to or substituted for publications.

  Synergistic Activities. List no more than 5 professional and scholarly activities related to the effort proposed.

  - *Current and Pending Support*. List all current and pending support. For each organization providing support, show the total award amount for the entire award period (including indirect costs) and the number of person-months per year to be devoted to the project. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review.

- *Identification of Potential Conflicts of Interest or Bias in Selection of Reviewers.* Provide the following information in this section:

  Collaborators and Co-editors: List in alphabetical order all persons, including their current organizational affiliation, who are, or who have been, collaborators or co-authors with you on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of this application. Also, list any individuals who are currently, or have been, co-editors with you on a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of this application. If there are no collaborators or co-editors to report, state "None."

  Graduate and Postdoctoral Advisors and Advisees: List the names and current organizational affiliations of your graduate advisor(s) and principal postdoctoral sponsor(s) during the last 5 years. Also, list the names and current organizational affiliations of your graduate students and postdoctoral associates during the past 5 years.

Bibliography & References Cited (Field 8 on the form)

Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application. **In order to reduce the number of files attached to your application, please provide the Bibliography and References Cited information as an appendix to your project narrative. Do not attach a file in field 8.** This appendix will not count in the project narrative page limitation.

Facilities & Other Resources (Field 9 on the form)

This information is used to assess the capability of the organizational resources, including subawardee resources, available to perform the effort proposed. Identify the facilities to be used (Laboratory, Animal, Computer, Office, Clinical and Other). If appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Describe only those resources that are directly applicable to the proposed work. Describe other resources available to the project (e.g., machine shop, electronic shop) and the extent to which they would be available to the project. **In order to reduce the number of files attached to your application, please provide the Facility and Other Resource information as an appendix to your project narrative. Do not attach a file in field 9.** This appendix will not count in the project narrative page limitation.

Equipment (Field 10 on the form)

List major items of equipment already available for this project and, if appropriate identify location and pertinent capabilities. **In order to reduce the number of files attached to your application, please provide the Equipment information as an appendix to your project narrative. Do not attach a file in field 10.** This appendix will not count in the project narrative page limitation.

Other Attachment (Field 11 on the form)

If you need to elaborate on your responses to questions 1-5 on the "Other Project Information" document, **provide the information as an appendix to your project narrative. Do not attach a file in field 11.**

Also, attach the following files:

- No additional files are required.

3. RESEARCH AND RELATED BUDGET.

Complete the Research and Related Budget form in accordance with the instructions on the form (Activate Help Mode to see instructions) and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this announcement (See PART IV, G).

Budget Justification (Field K on the form).

Provide the required supporting information for the following costs (See R&R Budget instructions): equipment; domestic and foreign travel; participant/trainees; material and supplies; publication; consultant services; ADP/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify your budget request. If cost sharing is required, provide an explanation of the source, nature, amount and availability of any proposed cost sharing. Attach a single budget justification file for the entire project period in Field K. The file automatically carries over to each budget year.

4. R&R SUBAWARD BUDGET ATTACHMENT(S) FORM.

Budgets for Subawardees, other than DOE FFRDC Contractors. You must provide a separate cumulative R&R budget for each subawardee that is expected to perform work estimated to be more than $100,000 or 50 percent of the total work effort (whichever is less). If you are selected for award, you must submit a multi-year budget for each of these subawardee (See Section IV.D for submission of Subawardees' multi-year budgets). Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET ATTACHMENT(S) FORM and e-mail it to each subawardee that is required to submit a separate budget. Note: Subwardees must have installed PureEdge Viewer before they can

complete the form. After the Subawardee has e-mailed its completed budget back to you, attach it to one of the blocks provided on the form. Use up to 10 letters of the subawardee's name (plus .xfd) as the file name (e.g., ucla.xfd or energyres.xfd).

5. **SF-LLL Disclosure of Lobbying Activities**
If applicable, complete SF- LLL. Applicability: If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant/cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying."

D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS.

The Department anticipates that no additional submissions will be required. However, it reserves the right to request additional or clarifying information for any reason deemed necessary.

E. SUBMISSION DATES AND TIMES.

1. Pre-application Due Date.

Potential applicants are strongly encouraged to submit a brief pre-application, referencing Program Notice DE-FG02-06ER06-10, for receipt by DOE by February 22, 2006. A response to the preapplications encouraging or discouraging formal applications will be communicated to the applicants by March 3.

Preapplications referencing Program Notice DE-FG02-06ER06-10, should be sent to SClifesci.lowdose@science.doe.gov. Applications submitted to the Office of Science must be submitted electronically through Grants.Gov to be considered for award.

2. Application Due Date.

Formal applications submitted in response to this notice **must be received by 8:00 p.m., Eastern Time, April 26, 2006**, in order to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2007. You are encouraged to transmit your application well before the deadline. APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.

F. GOVERNMENTAL REVIEW .

This program is not subject to Executive Order 12372 – Intergovernmental Review of Federal Programs.

G. FUNDING RESTRICTIONS.

Cost Principles**.** Costs must be allowable in accordance with the applicable Federal cost principles referenced in 10 CFR Part 600.

Pre-award Costs**.** Recipients may charge to an award resulting from this announcement pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 10 CFR Part 600. Recipients must obtain the prior approval of the contracting officer for any pre-award costs that are for periods greater than this 90 day calendar period.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

1. Where to Submit.

APPLICATIONS MUST BE SUBMITTED THROUGH GRANTS.GOV TO BE CONSIDERED FOR AWARD. Submit electronic applications through the "Apply for Grants" function at www.Grants.gov. If you have problems completing the registration process or submitting your application, call Grants.gov at 1-800-518-4726 or send an email to support@grants.gov.

2. Registration Process.

You must COMPLETE the one-time registration process (all steps) before you can submit your first application through Grants.gov (See www.grants.gov/GetStarted). **We recommend that you start this process at least two weeks before the application due date**. It may take 14 days or more to complete the entire process. Use the Grants.gov Organizational Registration Checklists at http://www.grants.gov/assets/OrganizationRegCheck.doc to guide you through the process. IMPORTANT: During the CCR registration process, you will be asked to designate an E-Business Point of Contact (EBIZ POC). The EBIZ POC must obtain a special password called "Marketing Partner identification Number" (MPIN).

Part V - APPLICATION REVIEW INFORMATION

A. CRITERIA

1. Initial Review Criteria.

Prior to a comprehensive merit evaluation, DOE will perform an initial review in accordance with 10 CFR 605.10(b).

2. Merit Review Criteria.

Applications will be subjected to scientific merit review (peer review) and will be evaluated against the following evaluation criteria listed in descending order of importance as codified at 10 CFR 605.10(d):

1. Scientific and/or Technical Merit of the Project.
2. Appropriateness of the Proposed Method or Approach.
3. Competency of Applicant's Personnel and Adequacy of Proposed Resources.
4. Reasonableness and Appropriateness of the Proposed Budget.

The evaluation will include program policy factors such as the relevance of the proposed research to the terms of the announcement and the Department's programmatic needs. External peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Non-federal reviewers may be used, and submission of an application constitutes agreement that this is acceptable to the investigator(s) and the submitting institution. Applications found to be scientifically meritorious and programmatically relevant will be selected in consultation with DOE and NASA selecting officials depending upon availability of funds in each agency's budget. In the course of the selection process, projects will be identified as addressing DOE requirements, NASA requirements, or both. If a project is funded, beginning in the first year of funding, at least one member of the project team will be required to attend annual investigator meetings, and reasonable travel expenses may be submitted as part of the project budget. The selected projects will be required to acknowledge support by one or both agencies, as appropriate, in all public communications of the research results.

B. REVIEW AND SELECTION PROCESS.

1. <u>Merit Review</u>.

Applications will be subjected to formal merit review (peer review) and will be evaluated against the evaluation criteria codified at 10 CFR 605.10(d) listed above, as well as the additional criteria listed above.

2. <u>Selection</u>.

The Selection Official will consider the merit review recommendation, program policy factors, and the amount of funds available.

3. Discussions and Award.

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 10 CFR part 600 and 605; and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES.

DOE is striving to make awards within eight months. The time interval begins on the date applications are due or the date the application is received, if there is no specified due date/deadline.

Part VI - AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES.

1. Notice of Selection.

DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Part IV.G with respect to the allowability of pre-award costs.)

Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

2. Notice of Award.

A Notice of Financial Assistance Award issued by the contracting officer is the authorizing award document. It normally includes, either as an attachment or by reference: 1. Special Terms and Conditions; 2. Applicable program regulations, if any; 3. Application as approved by DOE; 4. DOE assistance regulations at 10 CFR Part 600, or, for Federal Demonstration Partnership (FDP) institutions, the FDP terms and conditions; 5. National Policy Assurances to Be Incorporated As Award Terms; 6. Budget Summary; and 7. Federal Assistance Reporting Checklist, which identifies the reporting requirements.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS.

1. Administrative Requirements.

The administrative requirements for DOE grants and cooperative agreements are contained in 10 CFR Part 600 and 10 CFR Part 605 (See: http://ecfr.gpoaccess.gov), except for grants made to Federal Demonstration Partnership (FDP) institutions. The FDP terms and conditions and DOE FDP agency specific terms and conditions are located on the National Science Foundation web site at http://www.nsf.gov/awards/managing/fed_dem_part.jsp.

2. Special Terms and Conditions and National Policy Requirements.

Special Terms and Conditions and National Policy Requirements.
The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at http://grants.pr.doe.gov. The National Policy Assurances To Be Incorporated As Award Terms are located at http://grants.pr.doe.gov.

Intellectual Property Provisions.
The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at http://www.gc.doe.gov/techtrans/sipp_matrix.html.

C. REPORTING.

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F4600.2, attached to the award agreement.

PART VII - QUESTIONS/AGENCY CONTACTS

A. QUESTIONS

Questions regarding the content of the announcement must be submitted through the "Submit Question" feature of the DOE Industry Interactive Procurement System (IIPS) at http://e-center.doe.gov. Locate the program announcement on IIPS and then click on the "Submit Question" button. Enter required information. You will receive an electronic notification that your question has been answered. DOE will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. DOE cannot answer these questions.

Questions regarding the program (**technical**) requirements should be directed to:

General questions to SClifesci.lowdose@science.doe.gov

Agency Contacts:

For specific information on DOE interests, contact:

Dr. Noelle Metting
Telephone: (301) 903-8309
E-mail: Noelle.metting@science.doe.gov
Office of Biological and Environmental Research
U.S. Department of Energy
SC-23.1/Germantown Building
1000 Independence Avenue SW
Washington, DC 20585-1290

For specific information on NASA/HRP interests, contact:

Dr. Francis Cucinotta
Telephone: (281) 483-0968
E-mail: francis.a.cucinotta@nasa.gov.

PART VIII - OTHER INFORMATION

A. MODIFICATIONS.
Notices of any modifications to this announcement will be posted on Grants.gov and the DOE Industry Interactive Procurement System (IIPS). You can receive an email when a modification or an announcement message is posted by joining the mailing list for this announcement through the link in IIPS. When you download the application at Grants.gov, you can also register to receive notifications of changes through Grants.gov.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE.
DOE reserves the right, without qualification, to reject any or all applications received in response to this announcement and to select any application, in whole or in part, as a basis for negotiation and/or award.

C. COMMITMENT OF PUBLIC FUNDS.
The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by other than the Contracting Officer, either explicit or implied, is invalid.

D. PROPRIETARY APPLICATION INFORMATION.
Patentable ideas, trade secrets, proprietary or confidentional commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

"The data contained in pages _____ of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant."

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

"The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation."

E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL.
In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers

must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM.

Patent Rights. The government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. (See "Notice of Right to Request Patent Waiver" in paragraph G below.)

Rights in Technical Data. Normally, the government has unlimited rights in technical data created under a DOE agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE's own needs or to insure the commercialization of technology developed under a DOE agreement.

G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER.

Applicants may request a waiver of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this announcement, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784.

Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. This clause permits domestic small business and domestic nonprofit organizations to retain title to subject inventions. Therefore, small businesses and nonprofit organizations do not need to request a waiver.

H. N/A

I. N/A